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Datasheet for the decision of 25 July 2019

Case Number: T 2003/15 - 3.2.05

Application Number: 05788068.4

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Language of the proceedings: EN

Title of invention:
Structural panels for use in aircraft fuselages and other structures

Patent Proprietor:
The Boeing Company

Opponents:
Airbus Operations GmbH/Airbus Operations S.A.S/
Airbus Operations Ltd./Airbus Operations S.L./
Airbus S.A.S.

Relevant legal provisions:
EPC 1973 Art. 54(1), 56

Keyword:
Novelty (yes)
Inventive step (yes)

Decisions cited:
G 0003/14

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Case Number: T 2003/15 - 3.2.05

D E C I S I O N
of Technical Board of Appeal 3.2.05
of 25 July 2019

Appellants: (Opponents)	Airbus Operations GmbH/Airbus Operations S.A.S/ Airbus Operations Ltd./Airbus Operations S.L./ Airbus S.A.S. Kreetslag 10/316 Route de Bayonne/ New Filton House,Filton/Avda. de John Lennon s/ n/ 1 Rond Point Maurice Bellonte 21129 Hamburg(DE)/31060 Toulouse(FR)/ Bristol BS99 7AR(GB)/28906 Getafe(ES)/ 31700 Blagnac Cedex(FR) (DE)
Representative:	Isarpatent Patent- und Rechtsanwälte Behnisch Barth Charles Hassa Peckmann & Partner mbB Friedrichstrasse 31 80801 München (DE)
Respondent: (Patent Proprietor)	The Boeing Company 100 North Riverside Plaza Chicago, IL 60606-1596 (US)
Representative:	Boult Wade Tennant LLP 5th Floor, Salisbury Square House 8, Salisbury Square London EC4Y 8AP (GB)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 25 August 2015 concerning maintenance of the European Patent No. 1750929 in amended form.**

Composition of the Board:

Chairman	M. Poock
Members:	O. Randl
	D. Rogers

Summary of Facts and Submissions

I. The opponents filed an appeal against the decision of the opposition division that European patent No. 1 750 929 ("the patent") could be maintained in amended form.

II. The following documents are relevant for the appeal proceedings:

D4: DE 706 014;
D7: EP 1 216 816 A1;
D13: R. G. Pettit et al., "Validated Feasibility Study of Integrally Stiffened Metallic Fuselage Panels for Reducing Manufacturing Costs", NASA Technical Paper, dated May 2000.

III. Oral proceedings before the board were held on 25 July 2019.

IV. The appellants (opponents) requested that the decision under appeal be set aside and that the patent be revoked.

The respondent (patent proprietor) requested that, as a main request, the appeal be dismissed. Alternatively the respondent requested that the decision under appeal be set aside and that the patent be maintained on the basis of one of the first to fourth auxiliary requests, all filed under cover of a letter dated 6 April 2016.

V. The independent claims of the main request read (for claim 1, the reference numbers used by the board are in square brackets):

"1. [**1**] A structural panel (210) comprising:

[**2**] a skin (320);
[**3**] a first stiffener (330a) having a first flange portion (331a) mated to the skin and a first raised portion (334) projecting away from the skin (320);
[**4**] at least a second stiffener (330b) spaced apart from the first stiffener (330a), the second stiffener (330b) having [**5**] a second flange portion (331b) mated to the skin and a second raised portion (334) projecting away from the skin (320), wherein [**6**] at least one of the first flange portion (331a) of the first stiffener and the second flange portion (331b) of the second stiffener extends toward the other to form an at least approximately continuous support surface (335) extending between the first raised portion (334) of the first stiffener (330a) and the second raised portion (334) of the second stiffener (330a); and [**7**] a support member (341) having a base portion (344) mated to the first flange portion (331a) of the first stiffener and the second flange portion (331b) of the second stiffener without being mated to the skin (320) between the first raised portion of the first stiffener and the second raised portion of the second stiffener."

"19. A method for manufacturing a structural panel (210), the method comprising:
mating at least a first flange portion (331a) of a first stiffener (330a) to a skin (320), the first stiffener (330a) further including a first raised portion (334) projecting away from the skin (320);
mating at least a second flange portion (331b) of a second stiffener (330b) to the skin (320), the second stiffener (330b) further including a second raised portion (334) projecting away from the skin (320), wherein the first flange portion of the first stiffener is positioned at least proximate to the second flange

portion of the second stiffener to form an at least approximately continuous support surface extending between the first raised portion of the first stiffener and the second raised portion of the second stiffener; and mating a base portion (334) of a support member (341) to the first flange portion (331a) of the first stiffener (330a) and the second flange portion of the second stiffener (330b) without mating the base portion to the skin (320) between the first raised portion (334) of the first stiffener (330a) and the second raised portion (334) of the second stiffener (330b), wherein the base portion of the support member is positioned in contact with the support surface."

VI. The appellants (opponents) argued as follows:

(a) Claim interpretation

(i) "mated"

The term "mated" is to be understood as a functional feature. There is no technical effect associated with forming an element from separate parts. "Mated" only means that all the components should be connected mechanically to each other. There is no further intent or purpose behind this feature. An overly specific interpretation is not warranted.

This is a process feature used to characterise the claimed product. The opposition division relied on a very specific mating procedure disclosed in the patent, but the term "mated" is so general that any mating procedure could be used. Even an integrally formed panel is encompassed because the final product is the same.

(ii) "approximately continuous support surface"

This ambiguous and unclear feature has to be interpreted broadly. "Continuous" objects are objects prolonged or extended in space without interruption or cessation.

An "approximately continuous" surface is interrupted by a gap. Claim 1 fails to indicate the degree of "interruptedness" of the support surface. It encompasses support surfaces formed by adjacent flange portions, regardless of the gap width. The question of whether an interrupted surface may still provide support for a structural member resting upon it ultimately depends on the resilience and flexural rigidity of the structural member. Two flanges of two neighbouring stiffeners extending towards each other and having the same thickness (see the configuration disclosed in document D4) undoubtedly falls under the broad definition of "approximately continuous".

Whether the at least approximately contacting flange portions are able to form an at least approximately continuous support surface not only depends on the distance between the edges of the flange portions, but also on the presence or absence of significant surface steps or misalignments (see paragraph [0020] of the description). The absence of significant surface steps is an essential technical pre-condition for two flange portions forming an "at least approximately continuous surface".

(b) Novelty

Claims 1 and 19 of the main request lack novelty over documents D4 and D13.

(i) Novelty over document D4

The opposition division's findings are incorrect. Document D4 discloses (page 2, lines 109 to 112) that the rivet or weld points are provided to mate the flanges 16 with the corresponding mating surfaces. As can been seen in Fig. 3, the reference numeral 15 is denoted exclusively for rivet points of the stiffeners 1 (which need to be mated to the skin 11) or for rivet points of the flange portion of the support members 6 that is bent upwardly and faces the raised hat portion of the associated stiffeners 1. The mating surfaces are only to be found at the skin underneath the stiffeners and at the side faces of their hat portions. Document D4 does not disclose that the support members 6 are mated to the skin 11.

The skilled person would have immediately recognised that the stiffeners 1 and the support members 6 in Fig. 3 are drawn alike because all the profiled members are constructed the same way for reasons of manufacturing efficiency. Not all the rivet points 15 are needed if the profiled members are used in their function as support members. It cannot, therefore, be concluded that the drawn circles of Fig. 3 would directly have led the skilled reader to assume that the support members 6 must be mated to the skin 11. It is not correct that document D4 fails to disclose the feature of the "support member not being mated to the skin".

There is no requirement in claim 1 regarding the ratio between the spacing of the flange portions and the

width of the flange portions. Document D4 would have taught the skilled person to adapt the width of the flanges 16 to better support any support member 6 resting on two neighbouring flanges. On page 3, lines 10 to 20, in conjunction with Fig. 6 it is explained that the flanges 16 may be broadened with lobes 22, specifically at the positions where the support members 6 border on the stiffeners 1. It is therefore unambiguously disclosed that the gap between two neighbouring flanges may be variably narrowed to create a better support for the support members.

(ii) Novelty over document D13

The opposition division relied heavily on the process of curing stiffeners and the skin. However, the product of claim 1 is not obtained by co-curing. All that is required is that the stiffener is mated to the skin. The patent claims different possibilities of mating (co-curing and adhesive bonding, see granted claims 24 and 26). As the final product is indistinguishable from the integral panel of document D13, claim 1 is not new. The fact that a different process has been used to obtain the product is irrelevant for novelty.

The argument that feature 6 is not disclosed in document D13 is unpersuasive because all the mentally divided parts like flange portions and raised portions are just functional descriptions of integral parts of one single component. It does not matter whether those parts are separate or integral. "Tear strap" is just a functional definition for a part formed on the skin for stopping cracks. The distinction between flange portion and tear straps is not meaningful. Both correspond to portions extending parallel to the skin and stabilising

the stiffener. Thus, the tear strap of document D13 is a flange portion.

(c) Inventive step

Claim 1 of the main request lacks inventive step over document D4 in combination with the common knowledge of the skilled person, and over document D13 in combination with either the common knowledge of the skilled person or, alternatively, the teachings of document D7.

(i) Starting from document D4

Document D4 is a suitable starting point. It pertains to the same field of technology, tries to achieve a similar effect as the patent and few, if any, structural modifications are needed to arrive at the subject matter of claim 1.

The technical effect associated with the alleged distinguishing features is being able to increase the mechanical stability of the structural panel when using joggle-less support members. The patent mentions the added costs associated with manufacturing frames with joggles and the associated need for special tooling and/or post-cure machining.

The objective technical problem solved is to simplify the manufacture of the panel components.

The argument that the skilled person would not have considered forming an at least approximately continuous surface between neighbouring flange portions 16 in the structure of document D4 due to increased material

costs is in stark contrast to what claim 1 of the main request achieves over the closest prior art.

The skilled person would have easily recognised that the cost savings in being able to facilitate manufacturing of profiled members outweigh by far the increased costs of a slightly higher number of profiled members overall.

The argument that the skilled person would have been deterred from arriving at the solution of claim 1 due to increased weight is also moot. The skilled person would have learned from Figs. 5 and 6 of document D4 that weight problems might be easily resolved by simply broadening the flanges 16 at suitable positions. Such broadened flaps 22 would allow further spacing of the stiffeners 1 while at the same time bringing the edges of neighbouring flanges 16 closer together, namely by forming broadened flaps 22. The associated increase in weight is insignificant.

Thus, document D4 would have prompted the skilled person to modify the placement and or flange geometry of the stiffeners to simplify the manufacture of the panel. The skilled person would have solved the objective technical problem by applying common knowledge in light of the suggestions made in document D4.

(ii) Starting from document D13

Document D13 is an excellent starting point because it deals with the same field of technology, discloses a panel of the same structural appearance and shows a way to avoid the presence of joggles.

The alleged distinguishing feature of claim 1 over the structure of document D13 is that the flange portions and the base portion of the support member are mated to the skin (see features 3, 5 and 7).

The technical effect associated with the distinguishing feature is the greater flexibility in panel design and the decreased raw material usage. The objective technical problem is defined accordingly.

The integral formation of structural panels and their formation from distinct parts are just design choices. The skilled person would have picked one of these choices without any inventive step being involved. Document D7 shows that switching from the integral design to a mated design does not amount to a change of paradigm. It was routine knowledge that those approaches could be applied. The skilled person would not have stuck to one choice but would have seen whether another choice offered any advantage. They would have understood that there would have to be some trade-off, but they might have accepted this in view of special advantages obtained.

There may be an infinite number of ways to deconstruct the panel of Fig. 9, but if each of them is obvious, the number of ways as such is not decisive.

The skilled person being a university graduate in mechanical engineering with enhanced knowledge in the construction and design of aircraft fuselage structure would not simply and mindlessly have deconstructed everything in a given integral structural panel into the smallest pieces possible. Instead, the skilled person would only have deconstructed the panel to such

a degree that similar parts would be kept together in components.

One of the most straightforward and reasonable ways to do so is to deconstruct the panel in horizontal levels - the skin level, the stiffener level and the frame level.

Page 20, lines 6 to 9, would have told the skilled person that the stringer includes both the foot and the tear strap. They would have kept those parts - which naturally and inherently serve the same function - together. The integral tear strap would have been kept as a flange portion adjacent to the foot portion of the stringer because it belonged to the stringer. There would have been no reason for the skilled person to arbitrarily cut off the tear strap.

Even if the skilled person would have deconstructed the panel of Fig. 9 in this way, they would have found explicit suggestions in document D13 to not form the integral tear strap as a separate part from the stiffener. According to the labelling of Fig. 9 of document D13, the "integral lands/stiffeners" are used "for crack deflection/arrest". The skilled person would have realised that the function of a tear strap (arresting cracks) should be taken over by the stiffeners. It would have made perfect sense for the skilled person to keep the tear strap as an integral part of the stiffener.

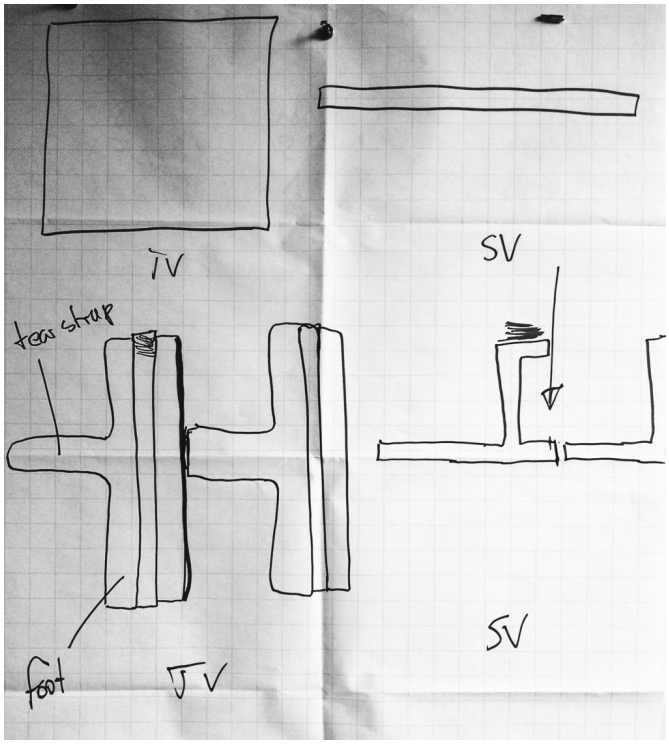
Even assuming that the skilled person would have detached the tear strap from the rest of the stiffener in Fig. 9 of document D13, they would still have ended up with several continuous parts adjacent to each other

that would have been at best separated by relatively small gaps, if any, in accordance with feature 6.

As can be seen in Figs. 6A and 6B of the opposed patent - drawings disclosing embodiments of the claimed subject-matter of the opposed patent - the stiffeners 630a and 630b only consist of upright web portions and relatively narrow flange stubs (as indicated by the cross-hatches). The flange portions 631a and 631b are distinct parts adjacent to and in contact with the flange stubs of the stiffeners 630a and 630b.

The skilled person - *arguendo* - deconstructing the panel of Fig. 9 of document D13 completely and arriving at distinct tear strap parts in between the distinct stiffeners would have realised that due to the tear strap parts and the flange stubs of the distinct stiffeners having the same thickness, those tear strap parts are, in fact, "flange portions" completely similar to the flange portions 631a and 631b in Figs. 6A and 6B.

When asked by the board to make a drawing of the decomposed parts, the appellant made the following sketch. The upper part shows the skin panel, from both the top view ("TV") and the side view ("SV"), whereas the lower part shows the stringer portion.



One possible choice would have been to form a grid comprising all the stringer and tear strap portions. Thus, the integral tear strap would have remained a portion of the stiffener and formed an integral flange portion of a distinct stiffener, even after deconstruction of the panel of Fig. 9 in document D13.

The separation of the skin portion provides greater flexibility because aircraft fuselages are not planar, and the panel curvature varies depending on where exactly the panels are used. The skilled person would also have expected a separation of the skin part to result in reduced raw material consumption. If the skin has to be formed by subtractive machining, quite a lot of material is lost.

This is not contradictory to the fact that document D13 claims that manufacturing costs are reduced by the integral design. Despite the greater losses of raw materials involved in the process of document D13, this

process might allow reduced installation time because there is no need for stringer clips, for example.

VII. The respondent (patent proprietor) argued as follows:

(a) Claim interpretation

(i) "mated"

The interpretation of the term "mated" proposed in the board's communication is correct.

The opposition division was not particularly focusing on co-curing but referred to this process because it was the most similar to the integral structure of document D13, and hence the most difficult to distinguish from the structure of document D13. The opposition division's point was that even if the closest form of mating, i.e. co-curing, were considered, the resultant structure was still distinguishable from the integral structure of document D13, for example by inspection of the co-curing zones using a micro-structural analysis. Generally speaking, if separate components are brought together, this remains discernible on the final product.

(ii) "approximately continuous support surface"

This feature should be interpreted such that any gap between the first and second flange portions must have a dimension that is relatively small in comparison with the dimension of the continuous parts.

(b) Novelty

The subject-matter of claim 1 is new over the disclosure of documents D4 and D13.

(i) Novelty over document D4

Document D4 provides a clear and unambiguous teaching that the support member is directly mated to the skin due to the presence of the rivets or weld points 15 in the region of the support member between the first and second flanges. They are shown along the whole length of the stiffeners and the support members. In this region, there is no component interposed between the support member and the skin, so the attachment points 15 would cause the support member to be mated to the skin. Thus, Figs. 2 and 3 show that the support member is mated to the skin at a position between the first flange and the second flange, contrary to the requirement of claim 1.

There is no need for the patent proprietor or the opposition division to establish that document D4 directly and unambiguously teaches to mate the support member to the skin. Rather, it is incumbent upon the appellant to show that document D4 directly and unambiguously teaches not to mate the support member to the skin. This has not been established in any event.

Also, in document D4, the first and second flanges are separated by the support member. As a consequence, they cannot extend to form an at least approximately continuous support surface.

(ii) Novelty over document D13

The claimed subject-matter is new over the disclosure of document D13 because this document does not disclose a panel with "mated" parts and also because the first and second flange portions are spaced apart and cannot form an at least approximately continuous support surface.

Document D13 discloses the presence of tear straps (see the first sentence of section 3.3.3). As a consequence, feature 6 cannot be disclosed because the flange portions are too remote from each other to form an approximately continuous support surface.

(c) Inventive step

The subject-matter of claim 1 is inventive over the state of the art cited by the appellant.

The skilled person is a notional person having an exhaustive knowledge of all the prior art but no imagination whatsoever. The appellant's attacks, by contrast, are very creative and do not reflect the operation of the skilled person's mind.

Both documents D4 and D13 are valid springboards. Document D13 is a weaker starting point because the skilled person would have had to go against the explicit teaching of the document to reach the invention.

(i) Starting from document D4

The skilled person would have wanted to avoid adding weight and material costs to a known design in the

absence of any other benefit outweighing the added weight and cost. In document D4, a slight widening of the flanges ("Lappen" 22) is made to accommodate fasteners. However, document D4 does not even suggest widening the flange portions to the extent needed to form an at least approximately continuous support surface. The skilled person would have been prejudiced against what would appear an unnecessary widening of the flange portions due to the increased cost and weight. A spark of imagination is required to arrive at the invention.

(ii) Starting from document D13

The opposition division never confirmed that the only distinguishing feature of claim 1 over document D13 is that the stiffeners are mated to the skin. Rather, the division considered the "mating" feature to be the distinguishing feature. It relates not only to the stiffeners being mated to the skin, but also to the support member being mated to the first flange portion and also to the second flange portion.

Document D13 would have clearly led the skilled person away from the invention because it insisted on using integral parts. The objective technical problem proposed by the board in its communication unfairly points to the invention. To arrive at the invention the skilled person would have had to contradict the general teaching of document D13. As a consequence, the real problem solved is to provide an alternative arrangement to that shown in document D13.

Document D7 is not helpful in this context, because it only makes clear that both the integral approach and the mated configuration were known. This cannot

counterbalance the clear teaching of document D13 that it is advantageous to have integral structures.

If the problem set by the board is accepted, it has to be noted that there are other solutions to gain flexibility. For instance, additive manufacturing would be a good solution. Even if the skilled person would have considered deconstructing the integral structure of document D13, there was an infinite number of ways of dividing the integral structure into separate components. It is not sufficient to show that the skilled person could have acted in a particular way. It has to be established that they would have done so. The obvious way of deconstructing the panel is to separate out each of the functional components. By doing this, the skilled person would not have arrived at the subject-matter of claim 1. None of the prior art documents (D4, D6, and even the prior art cited in the patent) discloses feature 6. To get to the claimed subject-matter, the skilled person would have had to use imagination and go beyond what the prior art taught. Horizontal slicing, as proposed by the appellant, is not disclosed or suggested in the prior art. Moreover, there are various ways of carrying out such horizontal slicing.

Document D13 does not disclose that the flanges and tear straps are quite the same, but only that they work in combination. Both are needed.

It is not correct to say that Fig. 6B of the patent suggests that the flange portion may be separated from the stiffener. There are indications in the drawing that suggest the opposite. Moreover, claim 1 makes clear that the stiffener and the flange portion are parts of the same element.

As correctly pointed out by the opposition division, even if the skilled person would have intended to deconstruct the integrated structure of document D13 into separate components joined together (akin to those shown in document D7), they would have ended up with first and second stiffeners separated by a tear strap separating the first and second flange portions such that they did not extend toward each other to form an at least approximately continuous support surface.

A combination with document D4 would not have led to the invention either because this document makes it clear that the flange portions are enlarged only by a small amount, which leaves a massive gap.

A combination with the prior art of the patent (support member with joggles) would have resulted in yet another arrangement where large gaps separate the flanges of adjacent stiffeners and accommodate the step-down portion of the support member between the joggles.

Reasons for the Decision

1. Applicable law

The application on which the patent is based was filed on 28 March 2005. In application of Article 7 of the Act revising the EPC of 29 November 2000 (Special edition No. 4, OJ EPO, 217) and the Decision of the Administrative Council of 28 June 2001 on the transitional provisions under Article 7 of the Act revising the EPC of 29 November 2000 (Special edition No. 4, OJ EPO, 219), Articles 54(1),(2) and 56 EPC 1973 apply in the present case.

2. Claim interpretation

2.1 "mated"

Features 3 and 5 require flange portions to be mated to the skin of the structural panel.

The patent does not provide a particular definition of the concept of mating. Therefore, the general meaning of the word, in the field under consideration, is to be determined. The Oxford English Dictionary provides the following definitions for the verb "mate":

- "to join (a thing) with or to a suitable counterpart; to associate, couple ..."; and
- "to fit or join (a mechanical part) with or to another."

This meaning appears to be in line with the way the verb "mate" is used in the patent. Neither the patent nor the general meaning of the word supports the argument that the skilled person would have understood the term "mated" to merely mean "mechanically connected".

Rather, the concept of mating is to be understood as two distinct elements being joined to each other to form a unity.

Conversely, if an object can be mentally divided into two parts but the two parts have never existed separately, i.e. because the object was manufactured as a unit, its parts cannot be said to be mated to each other.

It is possible to understand the feature "mated" as a "product-by-process" feature. Such a feature can only delimit the claimed product to the extent that it structurally defines it. That being said, the board has no doubt that the feature does indeed structurally define the claimed panel. Close inspection would have allowed the skilled person to detect whether the panel was an integral piece or whether it was obtained by mating separate elements. The assertion that this would not have been possible is not plausible and has not been backed by any supporting evidence.

2.2 "at least approximately continuous"

The requirement in feature 6 that the flange portions extend toward each other to form an "at least approximately continuous" support surface was objected to as being unclear. However, this feature was present in granted claim 1, which means that the objection is beyond the scrutiny of the board (see decision G 3/14 of the Enlarged Board of Appeal, OJ EPO 2015, A102). This notwithstanding, the feature needs to be interpreted by the board.

The patent does not provide a definition of the concept of "approximately continuous" surfaces.

The general meaning of the terms would have led the skilled person to understand that an "at least approximately continuous surface" was a surface that was fully continuous or approximately (i.e. "in an approximate manner, nearly", according to the Oxford English Dictionary) continuous.

To better understand the concept of "approximately continuous", the skilled person would have considered

the disclosure of the patent as a whole and found that the expression was used several times in the patent:

- Paragraph [0007] recites the feature but does not provide any further insight on how it is to be understood.
- Paragraph [0018], which is part of the description of the embodiment of Figs. 3A and 3B, discloses that "the stiffeners 330 can be positioned on the skin 320 such that the first flange portions 331a at least approximately contact the second flange portions 331 b in which case the distance D is at least approximately zero. By aligning the flange portions 331 in the foregoing manner, the flange portions 331 can form a plurality of at least approximately continuous support surfaces 335 extending between the raised portions 334 of the stiffeners 330". (Underlining added by the board.)

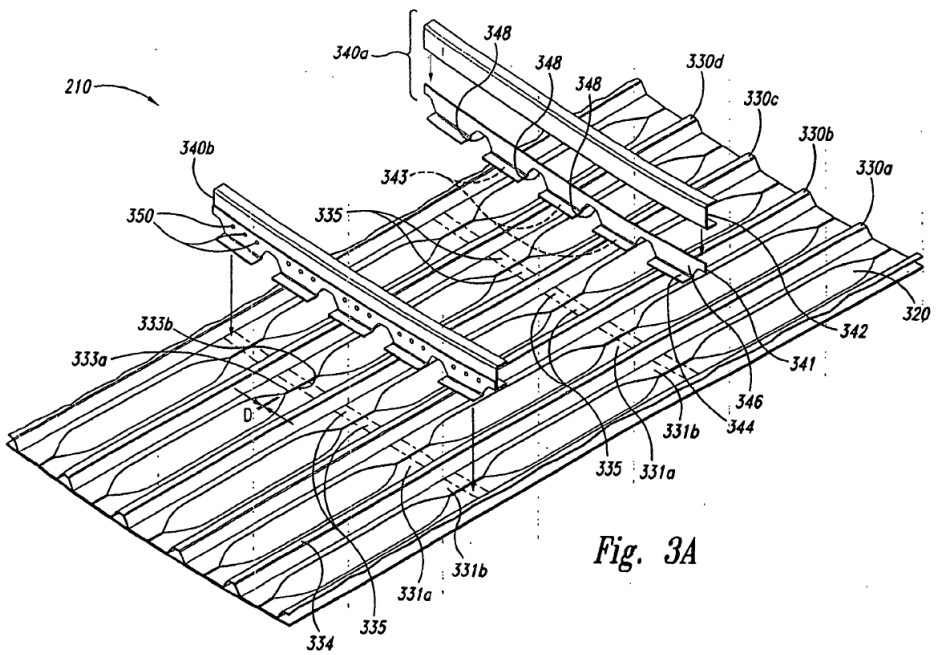


Fig. 3A

The argument that paragraph [0018] is not a decisive disclosure for the interpretation of the feature under consideration because it is silent on

its technical effect is unpersuasive. The passage clearly discusses the embodiment shown in Figs. 3A and 3B and explicitly uses the language of the feature that is to be interpreted.

- Paragraph [0020] adds: "The mating surfaces 343 of the illustrated embodiment are absent any joggles between the mouse holes 348 because the corresponding support surfaces 335 to which they mate are at least approximately continuous between the stiffeners 330 and do not include any significant surface steps or misalignments." (Underlining added by the board.)

Having considered all the above, the skilled person would have understood that an "at least approximately continuous surface" was to be understood as a surface that is either continuous or made up of several continuous parts such that adjacent parts were separated by relatively small gaps.

The attempt to interpret this feature so broadly that it encompasses virtually any gap width between adjacent continuous parts is excessive. Although the precise limits of what still qualifies as "approximately continuous" are unknown, the skilled person would not have adopted so broad an interpretation. Rather, the "approximately" language suggests that the gap dimension has to be relatively small in comparison with the dimension of the continuous parts. Whether a particular embodiment is encompassed by the claim is a question to be decided *in concreto* and cannot be decided in general terms.

There is some merit to the argument that the horizontal distance between adjacent flange portions is not the

only parameter determining whether they form an at least approximately continuous support surface, and that for instance a significant difference of the thickness of adjacent flange portions may result in there being no continuous support surface in spite of the horizontal gap between them being small. However, this is also an issue that cannot be decided *in abstracto*. It must be assessed in view of the circumstances of each case.

3. Novelty (Article 54(1) EPC 1973)

3.1 Over document D4

The opposition division was of the opinion that document D4 did not disclose features 6 and 7.

3.1.1 Feature 6

According to this feature, the first flange portion of the first stiffener and the second flange portion of the second stiffener extend toward each other to form an at least approximately continuous support surface extending between the raised portions of the stiffeners.

It was argued that the adjacent flanges ("Abbiegungen") 16 (see Fig. 3) of the stiffeners ("Holmgurte") 1 and 4 (see Fig. 2) form an approximately continuous support surface.

Fig.2

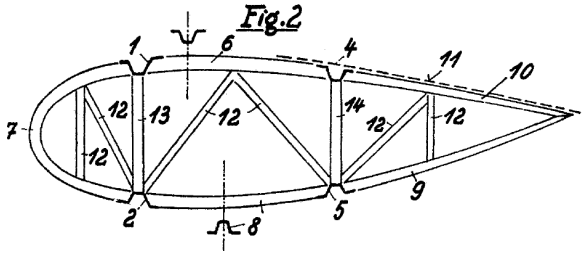
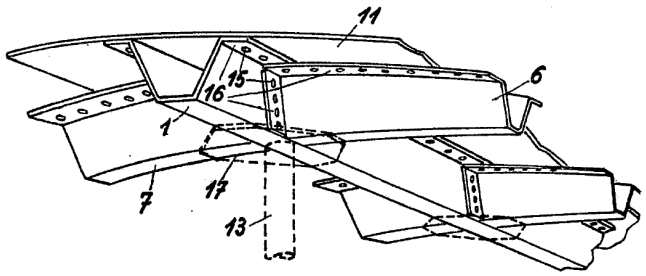


Fig. 3



Based on its interpretation of feature 6 (see point 2.1), the board cannot endorse this argument because the gap between the flanges is much greater than the dimension of the flanges.

It is true that the passage on page 3, lines 10 to 20, teaches that the flanges 16 may be broadened to facilitate connections, but in this context document D4 refers to Fig. 6, which suggests that the broadening envisaged is far from resulting in an approximately continuous surface.

Fig. 5

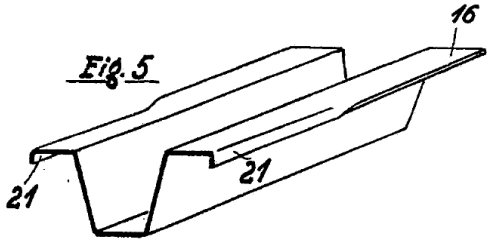
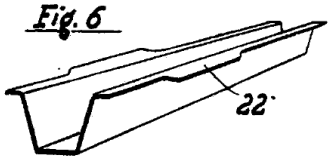


Fig. 6



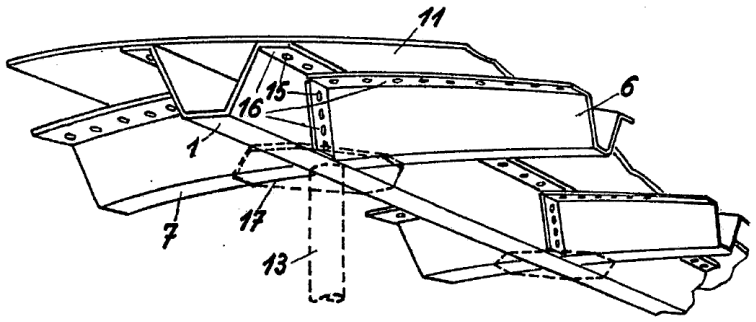
Therefore, document D4 does not disclose feature 6.

3.1.2 Feature 7

Feature 7 requires the support member to have a base portion that is mated to the flange portions of the stiffeners without being mated to the skin between their raised portions.

Again, the precise disclosure of Fig. 3 of document D4 appears to be decisive. The opposition division argued that the rivets or weld points ("Niet- oder Schweißpunkte") 15 provided at the flanges of the stiffener 1 and the support member ("Rippengurt") 6 mated the support member to the skin between the corresponding raised portions.

Fig. 3



It was argued that reference 15 was only used for rivet points of the flange portion or for connections between the stiffener 1 and the support member 6. The similar dots on the support member 6 opposite to the skin ("Beplankung") 11 were there only because the stiffeners 1 and the support members 6 were manufactured in the same way (page 2, lines 67 to 73).

There is no clear and unambiguous disclosure in document D4 that there is mating between the base portion 6 and the skin 11 (as the opposition division assumed, based on Figs. 2 and 3). Nor is there a clear

and unambiguous disclosure that there is no mating. Figure 3 certainly suggests that mating between the base portion 6 and the skin 11 is an option, and there would be good reason to provide such mating. However, in the absence of any clear disclosure, feature 7 cannot be said to be clearly and unambiguously disclosed.

3.1.3 Conclusion

The subject-matter of claim 1 is new over the disclosure of document D4 because this document does not clearly and unambiguously disclose features 6 and 7.

3.2 Over document D13

Document D13 is a feasibility study of integrally stiffened fuselage panels performed by the respondent for NASA. The relevant part of the disclosure of document D13 is found on pages 19 and 20, including Figs. 9 and 10, where unidirectionally stiffened concepts are described.

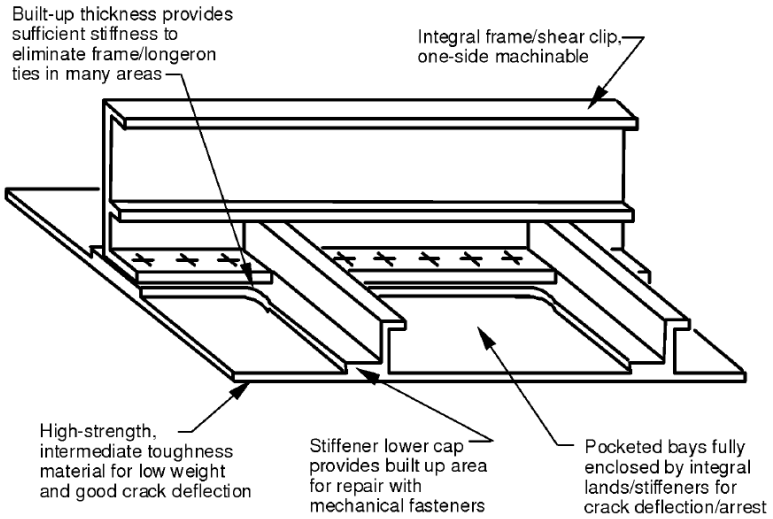


Figure 9. Integral Upper Fuselage Concept

The opposition division found that document D13 did not disclose the feature "mated" (see point 5.1.3 of the decision under appeal). The board understands this to mean that features 3, 5 and 7 are not disclosed.

The core argument of the opposition division was that document D13 disclosed an integral structural panel, which could not be said to be mated. This is in line with the board's interpretation of the word "mated" (see point 2.1 above).

Therefore, the subject-matter of claim 1 is new over the disclosure of document D13.

3.3 Conclusion on novelty

The subject-matter of claim 1 is new within the meaning of Article 54(1) EPC 1973 over the disclosure of the state of the art cited against it.

The same conclusion applies to claim 19.

4. Inventive step (Article 56 EPC 1973)

4.1 Starting from document D4

4.1.1 Differences

As explained above (see point 3.1), claim 1 differs from the disclosure of document D4 by features 6 and 7.

4.1.2 Technical effects

Paragraph [0020] of the patent describes the embodiment of Figs. 3A and 3B.

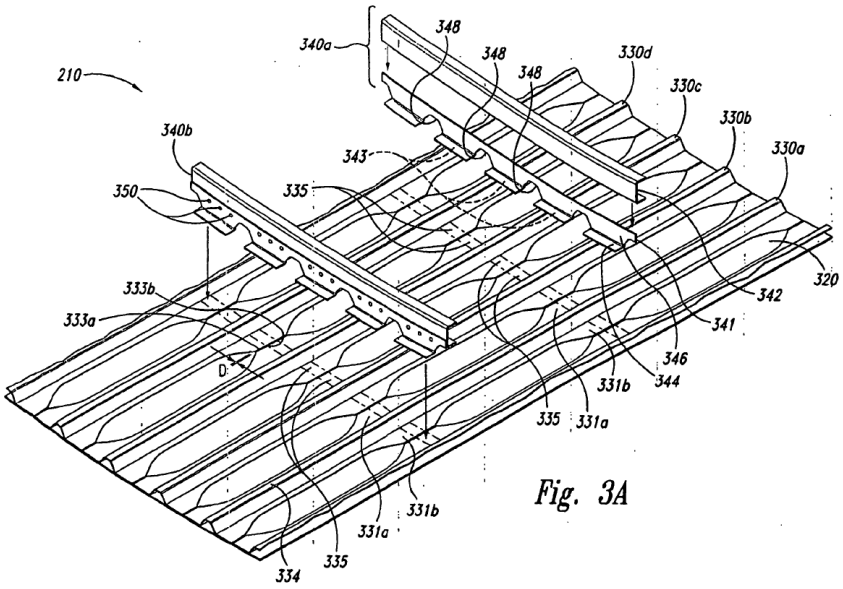


Fig. 3A

It contains the following statement:

> "The mating surfaces 343 are configured to contact corresponding ones of the support surfaces 335 extending between the raised portions 334 of the stiffeners 330. The mating surfaces 343 of the illustrated embodiment are absent any joggles between the mouse holes 348 because the corresponding support surfaces 335 to which they mate are at least approximately continuous between the stiffeners 330 and do not include any significant surface steps or misalignments. An advantage of this feature is that it avoids the added costs associated with manufacturing frames with joggles."

Accordingly, the technical effect of features 6 and 7 consists in the avoidance of joggles and, consequently, in the reduction of manufacturing costs (see also paragraph [0005]).

However, the device according to document D4 appears not to have any joggles (see Fig. 3) either. Thus, this formulation of the objective technical problem seems not to be appropriate.

When considering the device of document D4, the skilled person would have understood the technical effect of forming an approximately continuous support surface to be that the mating between the stiffener and the support member could be strengthened because the number of rivets or weld points 15 that connected them could be increased.

4.1.3 Objective technical problem

The definition of the objective technical problem as "simplifying the manufacturing of the components of the structural panel" is based on a technical effect that appears to be obtained over the prior art disclosed in the patent (Fig. 1) rather than with respect to the disclosure of document D4.

Rather, the board considers that the objective technical problem is to strengthen the mating between the stiffener and the support member.

4.1.4 Obviousness

The skilled person starting from document D4 and wishing to strengthen the mating between the stiffener and the support member would not have considered extending the flange portions of the stiffener to the extent that they formed an approximately or completely continuous support surface. Such a solution would have involved a considerable increase of weight and material costs. Therefore, the drawbacks of this solution would

have appeared to outweigh the benefit to be obtained by increasing the number of rivets or weld points 15.

As a consequence, it has not been persuasively demonstrated that claim 1 lacks inventive step over the teaching of document D4.

4.2 Starting from document D13

4.2.1 Differences

As explained above (see point 3.2), claim 1 differs from the embodiments shown in Figs. 9 and 10 of document D13 in that the flange portions are mated to the skin (features 3 and 5) and to the base portion of the support member (feature 7).

4.2.2 Objective technical problem solved by the invention

The patent is silent on the technical effect of the distinguishing feature. Again, the problem solved by the invention over the prior art discussed in the patent (i.e. avoiding joggles) is not applicable here because document D13 discloses a panel without joggles.

Thus, the board needs to determine what the skilled person, taking into account the common general knowledge in the technical field concerned, would have considered to be the problem solved by the distinguishing feature. The parties disagreed with each other in this respect.

It was proposed that the objective technical problem is "how to gain greater flexibility in panel design and decrease raw material usage". The board does not find this formulation satisfactory. First, it is not clear

to the board how and why the invention would necessarily increase the flexibility of panel design. Second, the view that the invention decreases raw material usage appears to rely on the underlying assumption that the integral panel of document D13 is obtained by machining. However, as can be seen from Table 1 on page 6 of document D13, high speed machining is just one of the manufacturing alternatives disclosed. If, for instance, the integral fuselage structure is obtained by casting, the raw material usage would arguably be of the same order of magnitude as when the distinct parts are mated.

It was also argued that the objective technical problem consisted in providing an alternative way of fixing a frame in a structural panel. There is no doubt that the invention provides such an alternative. In the absence of any more persuasive formulation of the problem solved, the board retains this definition.

4.2.3 Obviousness

The board is not convinced that the skilled person starting from document D13 and faced with the problem of providing an alternative way of fixing a frame in a structural panel would have been led to the claimed subject-matter in an obvious way, for essentially two reasons.

First, it is not plausible that the skilled person would have started from the embodiment of Fig. 9 of document D9 and amended it in a way that goes against the whole thrust of document D13, i.e. that an integral design provides great advantages and is to be preferred over a composite design.

Second, even if the skilled person would have decided to go against the explicit teaching of document D13 and deconstruct the integral design disclosed in Fig. 9, they would have been faced with a great number of options and design choices. In the absence of any guidance in terms of prior art disclosures, the assertion that the skilled person would have been led to a panel design falling within the scope of claim 1 appears to be based on hindsight.

In view of the foregoing, the board has reached the conclusion that it has not been established that the skilled person starting from the teaching of document D13 would have been led to the invention in an obvious way.

4.3 Conclusion on inventive step

It has not been established that the subject-matter of claim 1 lacks inventive step within the meaning of Article 56 EPC 1973 in view of the disclosure of the state of the art cited against it.

The same conclusion applies to claim 19.

5. Conclusion

The appellant has failed to convince the board that the claims of the main request fail to comply with the requirements of the EPC. As a consequence, the appeal has to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

N. Schneider M. Poock

Decision electronically authenticated